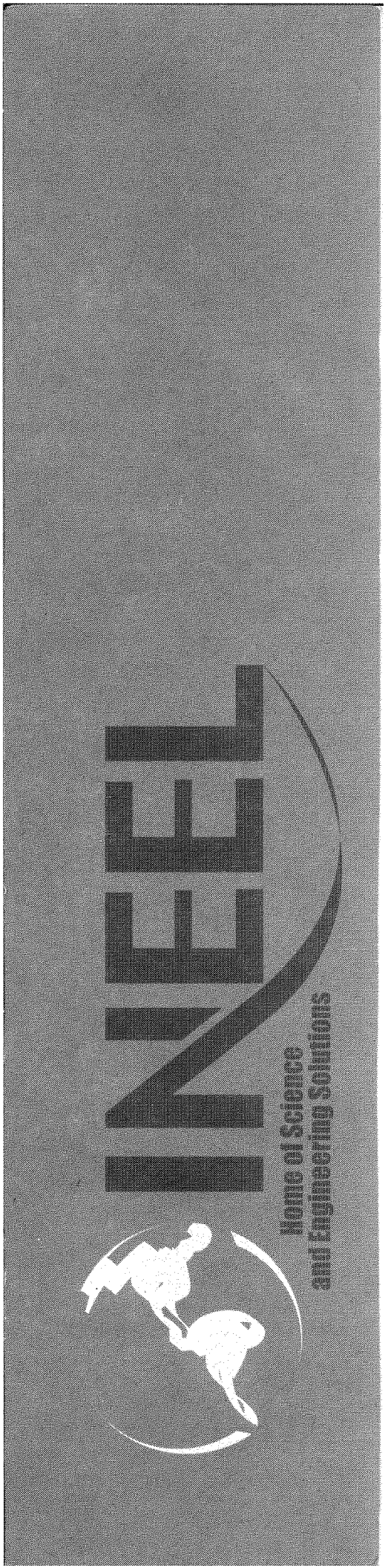

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Revision 5
Project No. 23364

Post-Record of Decision Monitoring Work Plan for the Central Facilities Area Landfills I, II, and III Operable Unit 4-12

October 2003

Idah Nation l ,Engineering and ,Environmental Laboratory
Bechtel BWXT Idaho, LLC

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October 2003

Idaho National Engineering and Environmental Laboratory
Idaho Completion Project
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environmental Management
Under DOE Idaho Operations Office
Contract DE-AC07-99ID13727

ABSTRACT

This document presents the monitoring plan for the Central Facilities Area Landfills I, II, and III Operable Unit 4-12, at the Idaho National Engineering and Environmental Laboratory. It includes the planned monitoring activities to be conducted pursuant to the requirements delineated in the *Record of Decision—Declaration for Central Facilities Area Landjlls I, II, and III (Operable Unit 4-12), and No Action Sites (Operable Unit 4-03).* Monitoring also will be conducted in accordance with recent Agency (i.e., U.S. Department of Energy Idaho Operations Office, U.S. Environmental Protection Agency, and Idaho Department of Environmental Quality) recommendations, which are documented in the *Central Facilities Area Landjlls I, II, and III Five-Year Review Supporting Documentation.* As delineated in the Record of Decision, groundwater monitoring at the landfills is designed to (1) establish a baseline of potential contaminant concentrations in the Snake River Plain Aquifer against which hture data could be compared, and to (2) ensure that drinking water standards are not exceeded in the aquifer due to contaminant migration from the landfills. Infiltration monitoring and vadose zone monitoring are designed, also in accordance with the Record of Decision, to evaluate the effectiveness of the native soil cover and migration of potential contaminants from the landfills.

Based on Agency recommendations in the Five-Year Review Documentation, soil gas monitoring and groundwater monitoring will continue at the Central Facilities Area on an annual basis. Landfill moisture monitoring at the landfills will continue until the Agencies decide otherwise.

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FIGURES

TABLES

ACRONYMS

CFA	Central Facilities Area
COC	contaminant of concern
CY	calendar year
DOE-ID	U.S. Department of Energy Idaho Operations Office
EPA	U.S. Environmental Protection Agency
IDEQ	Idaho Department of Environmental Quality
INEEL	Idaho National Engineering and Environmental Laboratory
MCL	maximum contaminant level
NAT	neutron access tube
NPAT	neutron-probe access tube
ROD	Record of Decision
TDR	time-domain reflectometer
USGS	United States Geological Survey
VOC	volatile organic compound

Post-Record of Decision Monitoring Work Plan for the Central Facilities Area Landfills I, II and III Operable Unit 4-12

1. INTRODUCTION

This work plan has been prepared for the post-Record of Decision (ROD) (DOE-ID 1995) monitoring activities to be performed for Operable Unit 4-12 Central Facilities Area (CFA) Landfills I, II, and III at the Idaho National Engineering and Environmental Laboratory (INEEL) under the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991). This monitoring work plan was provided initially as part of the *Remedial Design/Remedial Action Work Plan for Central Facilities Area Landfill I, II, and III Native Soil Cover Project, Operable Unit 4-12* (DOE-ID 1996) for the native soil covers installed in 1996 and was used concurrently with construction of the landfill covers. The plan was subsequently revised. This revision reflects the current monitoring configuration at the landfills. It includes U.S. Department of Energy Idaho Operations Office (DOE-ID), U.S. Environmental Protection Agency (EPA), and Idaho Department of Environmental Quality (IDEQ) (hereinafter referred to as the Agencies) recommendations, which are documented in the *Central Facilities Area Landfills I, II, and III Five-Year Review Supporting Documentation* (DOE-ID 2002). This plan also includes annual reporting of groundwater nitrate concentrations that exceed 10 mg/L, and evaluation of nitrate concentration trends in the 5-year reports. This reporting is mandated by the *Final Comprehensive Record of Decision for Central Facilities Area Operable Unit 4-13* (DOE-ID 2000). The Agencies have agreed that the 2-year intensive monitoring period, which was described in the previous version of this plan, has ended. This plan reflects Agency agreement on the outyear monitoring that will continue to be performed at the landfills until otherwise determined by the Agencies.

1.1 Site Background

1.1.1 Site Description

Located 42 mi west of Idaho Falls, Idaho, the INEEL occupies 890 mi^2 of the northwestern portion of the Eastern Snake River Plain (see Figure 1). A physical description of the CFA landfills and landfill waste is provided in Section 1 of the Remedial Design/Remedial Action Work Plan (DOE-ID 1996). A summary of the CFA landfills' hydrogeologic characteristics is documented in the *Record of Decision—Declaration for Central Facilities Area Landfills I, II, and III (Operable Unit 4-12), and No Action Sites (Operable Unit 4-03)* (DOE-ID 1995). Details of the CFA landfills' hydrogeologic conditions are documented in the *Remedial Investigation/Feasibility Study for Operable Unit 4-12: Central Facilities Area Landfills I, II, and III at the Idaho National Engineering Laboratory* (Keck et al. 1995).

1.1.2 Contaminants of Concern

A Baseline Risk Assessment conducted for the CFA landfills was developed from information obtained during the remedial investigation/feasibility study and previous investigative activities. The Baseline Risk Assessment is included in the remedial investigation/feasibility study. It evaluates potential adverse health effects from exposure to identified contaminants of concern (COCs) detected at the landfills. The nature and extent of these contaminants are detailed and documented in the ROD (DOE-ID 1995) and incorporated herein by reference. Table 1 summarizes the identified COCs.

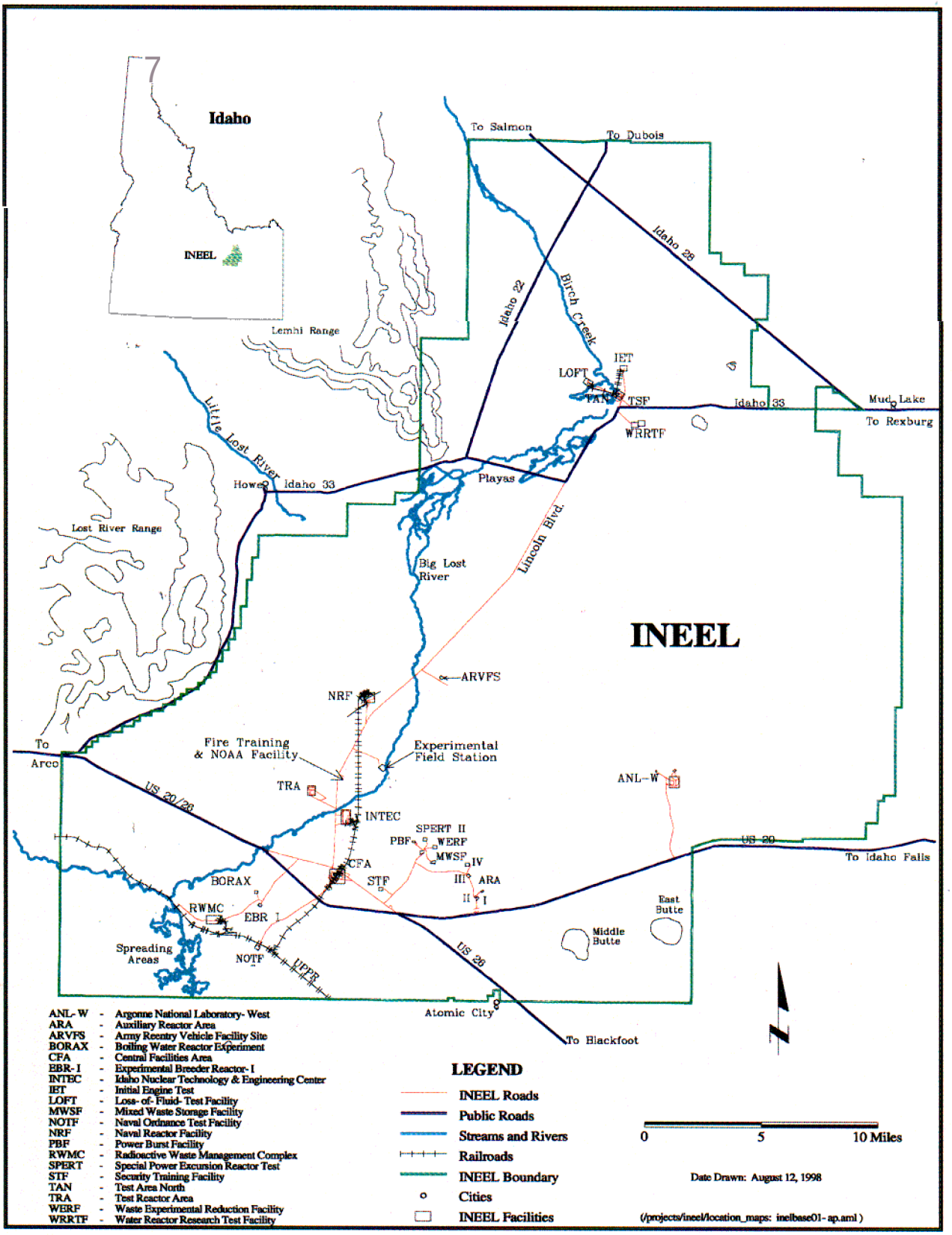

Figure 1. Map of the Idaho National Engineering and Environmental Laboratory showing the location of Site facilities.

Table 1. Summary of identified contaminants of concern.

Landfill I		Landfill II		Landfill III	
Groundwater	Soil	Groundwater	Soil	Groundwater	Soil
Cadmium	Polyaromatic hydrocarbons[a]	Beryllium	Polyaromatic hydrocarbon	Cadmium	—
Zinc	Beryllium	Cadmium	—	Zinc	—
—	Cobalt-60[b]	Zinc	—	—	—

a. Polyaromatic hydrocarbons consist of benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.
b. Cobalt-60 was detected in one out of 10 samples at a concentration of 0.10 pCi/g.

Other potential COCs might exist due to uncertainties associated with the CFA landfills' waste disposal history. In an effort to continue to establish a baseline and add to existing sampling data, a broad spectrum of analytes will be monitored beyond the initial 2-year intensive monitoring period (see Sections 4 and 5).

1.2 Monitoring Program Objectives

The monitoring plan is designed to provide data for use in evaluating whether the remedial action is meeting the remedial action objectives stated in the ROD (DOE-ID 1995). In particular, the monitoring program data will be used to evaluate the remedial action objectives in order to minimize infiltration and ensure that drinking water standards are not exceeded in the Snake River Plain Aquifer due to contaminant migration from the landfills.

Designed to monitor groundwater, vadose zone, and infiltration at all three landfills, the program integrates key objectives to:

- Monitor infiltration of moisture through the landfills' covers on a monthly basis
- Monitor soil gas volatile organic compounds (VOCs) and methane concentrations in the vadose zone near each landfill annually in the fall
- Monitor concentrations of contaminants in the groundwater near the landfills annually in the fall
- Establish a baseline of potential contaminant concentrations in the aquifer against which hture data could be compared
- Monitor groundwater flow direction in the aquifer near the landfills annually in the fall.

2. PLAN DESCRIPTION

2.1 Monitoring Phases

The original version of this monitoring plan had two phases of site monitoring: a 2-year intensive monitoring phase followed by a long-term monitoring phase. The 2-year intensive monitoring phase (short-term monitoring) was designed to integrate additional monitoring equipment, provide trend data from the various monitoring components in order to establish baseline-monitoring data, and support development of the long-term monitoring schedule and activities.

As planned for at the end of the first phase, the Agencies have reviewed the short-term monitoring data. The two years of sampling, from 1996 through 1998, were documented in the September 2000 Post ROD Monitoring Report (INEEL 2000), and sampling results through spring 2002 were documented in the November 2002 Five-Year Review Supporting Documentation (DOE-ID 2002), with additional monitoring and recommendations included in the 2002 Annual Monitoring Report (INEEL 2003c). Therefore, short-term monitoring extended longer than 2 years—from 1996–2002. The Agencies recommended in the Five-Year Review Supporting Documentation that long-term annual monitoring begin for groundwater monitoring and soil gas monitoring. Since the 5-year review, the Agencies recommended that moisture-infiltration monitoring continue on a monthly/bimonthly basis, until decided otherwise.

The recommended long-term monitoring schedule and activities (described in Sections 3–5) will be reviewed every 5 years to ensure that the remedial action continues to protect human health and the environment and to determine the need for further monitoring.

2.2 Action Levels

To ensure the soil cover's continued effectiveness, the monitoring system was designed to provide early detection of a potential release to the subsurface or groundwater. Therefore, soil gas monitoring results that exhibit a significant statistical upward trend at depth would trigger further evaluation. The trend will be determined to be significant if it is consistently higher, exceeds minimum concentration (based on Henry's Law partitioning that would cause water to be above the MCL), and exceeds the previous historical range in at least two consecutive sampling events.

Action levels were established as performance criteria by which the effectiveness of the soil cover would be measured. If an action level is exceeded, reevaluation of the selected remedy is triggered.

Based on existing information, regulatory requirements, and regulatory guidance, a groundwater action level triggering reevaluation of the remedial actions would be characterized as follows:

- Monitoring results for groundwater, which are attributable to the landfills and that exceed maximum contaminant levels (MCLs) or risk-based concentrations, as appropriate. Contaminants detected below or downgradient from the landfills, with a higher (statistically significant) concentration than upgradient from the landfills, may be considered attributable to the landfills.

The action levels for groundwater contaminant concentrations are based on existing regulatory requirements (i.e., drinking water MCLs) and regulatory guidance (i.e., EPA Region III risk-based concentrations).

If the current or hture action levels are exceeded, the Agencies and site contractors will meet to discuss response actions. Possible responses may include, but are not limited to, the following:

- Increasing sampling frequency
- Increasing the list of analytes tested
- Installing additional monitoring equipment
- Reinstituting short-term monitoring
- Recovering and recontouring affected areas of the landfills
- Selecting an alternate remedial action or modifying the existing action.

3. INFILTRATION MONITORING

3.1 Infiltration Monitoring Objectives

The objective of infiltration monitoring is to document the landfill covers' effectiveness at minimizing infiltration into the landfill waste. The infiltration monitoring system at the CFA landfills is designed to monitor infiltration through the landfill cover and to the top of the bedrock beneath the waste in selected representative locations.

3.2 Existing Infiltration Monitoring System

The current infiltration monitoring system consists of neutron moisture probes and time-domain reflectometer (TDR) arrays. In 1996, a shallow TDR system was installed at Landfills I and II to a depth of 0.6 m (2 ft). New, deep, or vertical TDR systems were installed in the native soil cover at Landfills II and III to a depth of 2.4 m (8 ft) during August and September 2000. Five previously existing neutron access tubes (NATs) also were used for moisture measurements. Figure 2 shows the locations of both the shallow and deep TDR arrays, as well as the NATs. Figure 3 shows the locations of groundwater monitoring and measurement wells. For detailed information pertaining to the landfill soil characteristics, refer to *Shallow Drilling Report for CFA Landfills II and III—FY-1988 Characterization of Soil Sediments* (Ansley, Hull, and Burns 1988).

3.2.1 Neutron Access Tubes

Some infiltration monitoring equipment existed at the CFA landfills before construction of the landfill covers. Five NATs were installed in Landfills II (three tubes) and III (two tubes), ranging in depth from 5.5 to 7 m (18.2 to 23 ft) below land surface. At Landfill II, one tube is located on the landfill (LF 2-07), with two located adjacent to the landfill (LF 2-03 and LF 2-04). At Landfill III, one tube is on the landfill (LF 3-05) and the second is located on the landfill's edge (LF 3-03). Soil-moisture readings are obtained at 0.3-m (1-ft) intervals. Details regarding the original construction of this equipment are contained in the Shallow Drilling Report for CFA Landfills II and III (Ansley, Hull, and Burns 1988). Currently, these same neutron-probe access tubes are used for infiltration monitoring at the CFA landfills.

3.2.2 Time-Domain Reflectometer Arrays

The second infiltration monitoring system in place at the CFA landfills is TDR arrays. The TDR arrays have two systems: (1) a shallow system that collected data at 15-cm (6-in.) intervals to a depth of 0.6 m (2 ft) and (2) a deep system that collects data from the surface to a depth of 2.4 m (8 ft), with data collected at 15-cm (6-in.) intervals. Monitoring of the shallow arrays was discontinued in 1998. After reviewing and analyzing the existing data in preparation for required review of the first 2 years of intensive monitoring, it was determined that the shallow TDR arrays required replacement with the new system that monitored to a deeper depth. In August and September 2000, the deeper systems were installed. More information on the installation of these arrays can be found in the Five-Year Review Supporting Documentation (DOE-ID 2002).

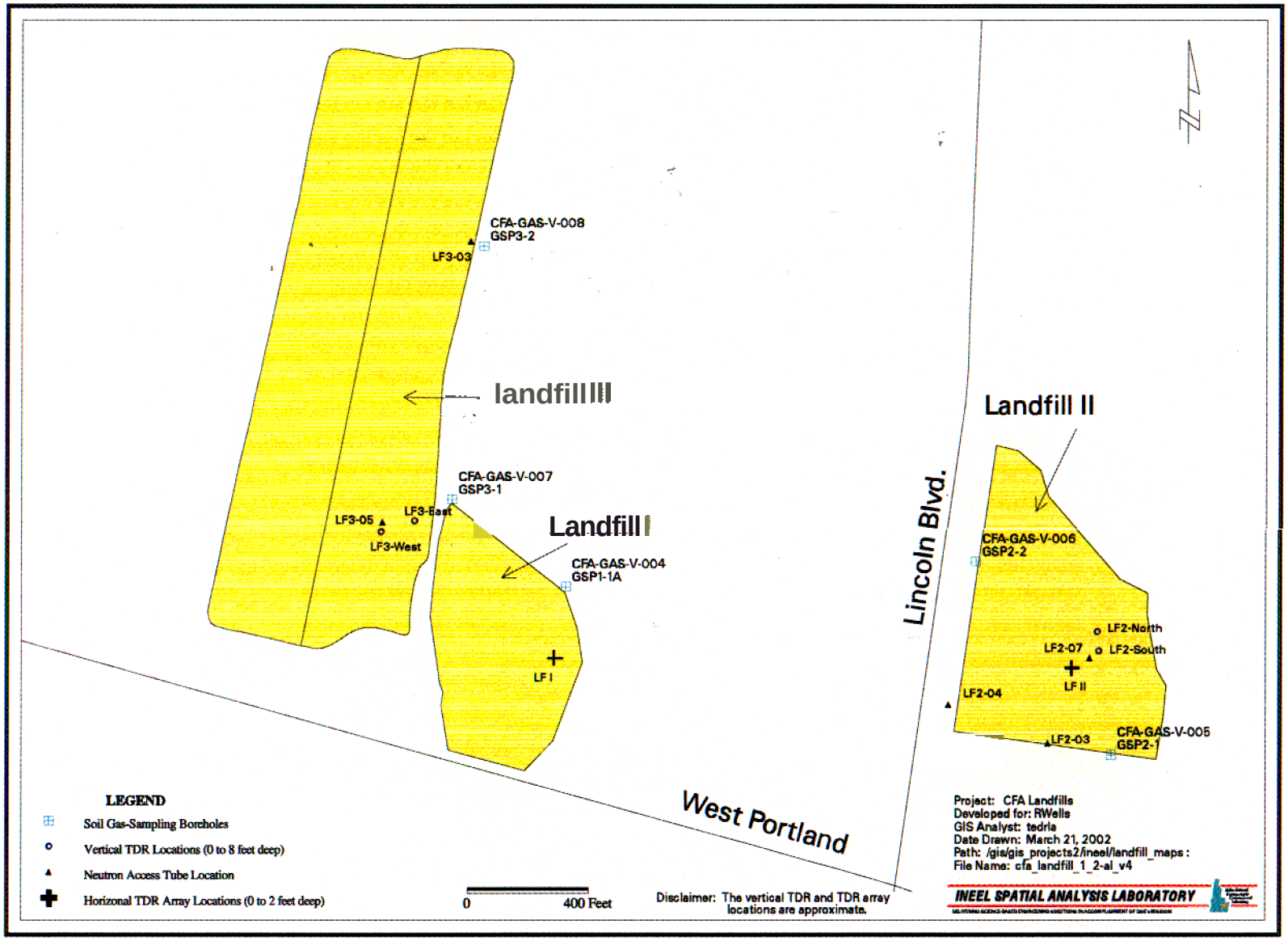

Figure 2. Map showing locations of time-domain reflectometer arrays, neutron access tubes, and soil-gas sampling boreholes.

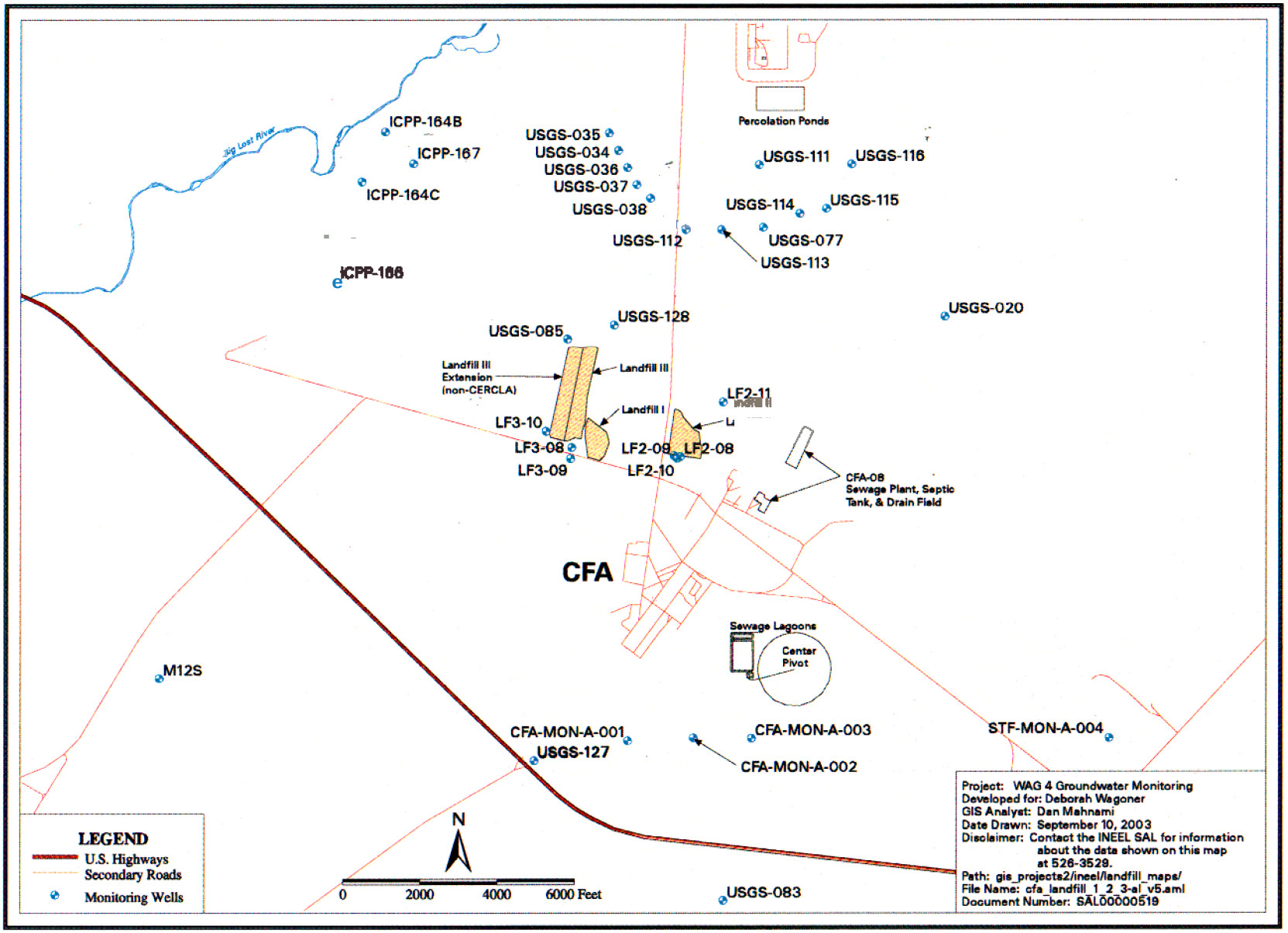

Figure 3. Map showing locations of groundwater monitoring and measurement wells.

A shallow TDR array was not installed in the cover of Landfill III, because modeling results indicated that infiltration through Landfill III's cover and existing material would be approximately two orders of magnitude less than through Landfill I, and one order of magnitude less than through Landfill II (Keck et al. 1995). Based on the greatly reduced infiltration expectations, which resulted from the shorter precipitation run-off path due to a narrower width of the landfill and the modeling results, installation of an array at Landfill III was not considered necessary.

The new, deep TDR systems were installed in Landfills II and III. Landfills II and III were selected for installation of the new TDR arrays, because the greatest risks for contaminant migration were associated with the waste disposed of at those landfills. Landfill I received primarily construction debris. The western waste trench, which is associated with Landfill I and received waste that was ignited periodically using flammable liquids, is actually located under Landfill III's eastern boundaries. Using this criterion, it was determined that a TDR array was not warranted at Landfill I. In addition, the TDR arrays at Landfills II and III were installed near the existing NATs, allowing for a more direct comparison of TDR data to the data obtained from the NATs. With the installation of the new TDR systems, monitoring of the original shallow TDR systems was discontinued.

The TDR method determines the soil's water content by employing a nondestructive technique that measures the soil's dielectric constant. To determine the constant, the method relies on the propagation velocity of a pulse as it travels along an electromagnetic transmission line (or probe) buried in the soil (Whalley 1993). The pulse's travel time yields an "apparent" probe length, which is dependent on the dielectric properties of the medium surrounding the probe. Because free water has a dielectric constant 20 times that of mineral matter, the soil's dielectric constant is dominated by the contribution from soil water. The soil's volumetric water content is calculated from the actual and apparent probe lengths.

3.3 Infiltration Data Collection and Analysis

Using a down-hole neutron probe, in situ soil moisture measurements will be collected and recorded at 0.3-m (1-ft) intervals in each of the existing neutron probe access tubes. The TDR system design allows for automated monitoring of soil moisture with the TDR arrays. Specific data collection procedures are included in the *Field Sampling Plan for the Post Record of Decision Monitoring Central Facilities Area Landjlls I, II, and III Operable Unit 4-12* (INEEL 2003a).

Monthly neutron probe logging for each of the five neutron probe access tubes will be conducted with an additional bimonthly collection in the months of January through April, if there is sufficient moisture to warrant it. Bimonthly collection will provide more detailed information during the period when the covers potentially experience the greatest amount of water infiltration, which is during the spring thaw period. Continuous TDR array-monitoring data will be downloaded weekly and compiled on a monthly basis.

4. VADOSE ZONE GAS MONITORING

4.1 Vadose Zone Gas-Monitoring Objectives

The objective of soil gas monitoring is to provide data to evaluate potential leaching of VOCs from the buried landfill waste at each landfill through the collection and analysis of soil gas samples. The VOC sampling is designed to detect VOCs both above and below the first interbed beneath the landfills (located approximately 14 m [45 ft] beneath the land surface).

4.2 Existing Vadose Zone Gas-Monitoring System

Before the remedial action, nine soil-gas sampling ports existed at CFA Landfills II and III. Landfill I did not have any soil-gas sampling ports. The depths of the existing soil-gas sampling ports range from 3.5 to 9.4 m (11.5 to 31 ft) below land surface. All soil-gas sampling ports were completed above the bedrock, either in the landfill waste or in surficial sediments. Details regarding the construction of this equipment are contained in the Shallow Drilling Report for CFA Landfills II and III (Ansley, Hull, and Burns 1988). These ports are maintained but not sampled.

As part of the remedial action, five soil-gas sampling boreholes were installed near the CFA landfills to monitor for soil gas and contaminants (see Figure 2). One borehole was installed adjacent to Landfill I; two boreholes were installed adjacent to Landfill II; and two boreholes were installed adjacent to Landfill III (one of which is proximal to Landfill I). Each borehole was completed with four soil-gas sampling ports, two above and two below the shallow interbed.

Gas sampling ports are designed to sample soil gas from discrete depths. The ports are constructed of 0.95-cm (0.375-in.) diameter, seamless stainless steel tubing with a 0.90-m (3-ft) perforated section located at the intended depth of the soil gas sample collection. One shallow sampling port was placed within the surficial sediments. One deep sampling port was placed in the basalt above the shallow interbed, which is approximately 12 to 18 m (40 to 60 ft) below the land surface. Two deep sampling ports were placed below the shallow interbed with the perforated section vertically separated by approximately 9 m (30 ft). The deep sampling ports' perforated sections were located adjacent to fracture zones in the basalt, in order to place the sampling location adjacent to the most probable avenue of soil gas migration.

Two standard groundwater monitoring wells with vapor ports will be installed. One well will be downgradient of Landfill I and the other well will be installed downgradient of Landfill II. Well completion design drawings and proposed well locations will be provided to the Agencies for discussion. Scheduling of sampling will be coordinated with other CFA wells after the new wells have been installed. Exact well locations will be included in the next version of this Post ROD Monitoring Plan.

4.3 Vadose Zone Gas Data Collection

Soil gas samples will be collected from each sample port on each soil-gas sampling borehole and will be analyzed for methane and VOCs. During sample collection, barometric data also will be obtained from the National Oceanic and Atmospheric Administration's CFA weather-monitoring station for use in data interpretation. Specific sample collection and analysis procedures are discussed in the Field Sampling Plan (INEEL 2003a). The soil gas ports will be sampled annually in the fall, in order to observe maximum vapor levels (see Appendix A for schedule). Soil gas analysis data will be validated to Level C. Soil gas sample collection and analysis for VOCs will continue until VOC concentrations demonstrate a significant and consistent downward trend and the Agencies agree during a 5-year review that the monitoring may cease.

5. GROUNDWATER MONITORING

5.1 Groundwater Monitoring Objectives

The objectives of groundwater monitoring at the CFA landfills include the following activities:

- Provide data for evaluating potential leaching of contamination to the Snake River Plain Aquifer
- Provide nitrate data for annual reporting and 5-year trend evaluation until nitrate concentrations fall below the MCL of 10 mg/L (DOE-ID 2000)
- Establish a baseline of potential contaminant concentrations in the aquifer against which future data could be compared
- Monitor the groundwater flow direction near the landfills.

Potential contaminant impact to the aquifer from the CFA landfills will be assessed by collecting groundwater samples from existing groundwater wells near the landfills.

5.2 Existing Groundwater Monitoring System

A series of groundwater monitoring wells exist within the vicinity of the CFA (see Figure 2). Specific monitoring wells in the landfills' immediate vicinity include one well that is adjacent and south of CFA Landfill III—LF3-10. Two wells are south of Landfill III—LF3-08 and LF3-09. Three wells are south of Landfill II—LF2-09, LF2-10, and LF2-08. The designated upgradient wells for groundwater sampling are LF2-11 for Landfill II, and USGS-128 for Landfills I and III. Additional wells located upgradient from the CFA landfills include United States Geological Survey (USGS) Monitoring Wells 34–38, 77, 85, and 111-116. Additional wells located downgradient from the CFA landfills include CFA-MON-001, CFA-MON-002, CFA-MON-003, USGS-83, and USGS-127. Monitoring Well USGS-20 is located crossgradient from Landfill II.

Two standard groundwater monitoring wells with vapor ports will be installed. One well will be downgradient of Landfill I and the other well will be installed downgradient of Landfill II. Well completion design drawings and proposed well locations will be provided to the Agencies for discussion. Scheduling of sampling will be coordinated with other CFA wells after the new wells have been installed. Exact well locations will be included in the next version of this Post ROD Monitoring Plan.

5.3 Groundwater Monitoring Data Collection

Groundwater samples will be collected from 11 wells near the CFA landfills and the new wells that are installed. Sampling of the vapor ports in these new wells also will occur. Table 2 presents a listing of the wells and the sampling rationale for each. In addition, groundwater-level measurements will be obtained for the 11 wells being sampled, as well as for 22 other wells located near the CFA landfills (see Section 5.3.1).

The groundwater samples will be analyzed for VOCs, anions, alkalinity, nitrate/nitrite (as nitrogen), and total metals (unfiltered only, unless there is an increasing trend of metals or increased indicators of turbidity, in which case filtered analyses also will be performed). Detectable analytes in the vapor also will be analyzed in the groundwater. Constituents—which will be reported as part of the VOC analysis—include 2-chloroethylvinylether, acetonitrile, dichlorodifluoromethane (Freon-12), methane, and trichlorofluoromethane (Freon-11).

Table 2. Groundwater monitoring wells and sampling rationale.

Well Name	Well Completion (depth below land surface in m [ft])	Depth to Bottom (ft)	Pump Depth (ft)	Sampling Rationale
LF2-08	Screened, 148–151 (485–495)	526	483	Downgradient from Landfill II
LF2-09	Screened, 143–151 (469–497)	676	486	Downgradient from Landfill II
LF2-11	Screened, 142–152 (466–499)	511	481	Crossgradient from Landfill II
LF3-08	Screened, 152–155 (500–510)	526	480	Downgradient from parts of Landfills I and III and crossgradient from other areas of Landfill I
LF3-09	Screened, 146–152 (480–500)	517	486	Downgradient from parts of Landfills I and III and crossgradient from other areas of Landfill I
LF3-10	Screened, 147–153 (481–501)	530	494	Adjacent to Landfill III
USGS-083	Open hole, 157–229 (516–752)	752	606	Further downgradient from CFA
USGS-128	Open hole, 139-186 (451-610)	615	523	Upgradient from Landfills I and III
CFA-MON-A-001	Screened, 149–158 (488–518)	547	514	Downgradient from CFA
CFA-MON-A-002	Screened, 149–158 (488–518)	526	516	Downgradient from CFA
CFA-MON-A-003	Screened, 150–156 (491–511)	515	508	Downgradient from CFA

CFA = Cents-a1Facilities Area
USGS = United States Geological Survey

Groundwater sampling and analysis will be performed annually in the fall in an effort to consolidate various ongoing groundwater-monitoring efforts at the INEEL and in keeping with the previously established routine for the CFA landfill monitoring.

During the October 2001 sampling event, Well USGS-083 was added to the sampling event as an additional downgradient well for the CFA. This well is located approximately 1,220 m (4,000 ft) farther downgradient from Wells CFA-MON-A-002 and CFA-MON-A-003. Well USGS-083 was proposed as an additional monitoring point for nitrates located downgradient from the former and current sewage treatment plants. A new well, USGS-128, was proposed for sampling during the October 2001 sampling event to replace monitoring and sampling from Wells USGS-085 and USGS-112. Figure 3 shows the location of the groundwater monitoring and measurement wells.

Groundwater monitoring will continue in accordance with the ROD (DOE-ID 1995) until the Agencies agree during a 5-year review that monitoring may cease. At such time, the nitrate levels in the groundwater should be consistently below the MCL. The schedule for monitoring is included in Appendix A. Groundwater sampling data will be validated to Level A.

5.3.1 Additional Depth-to-Water Measurements

In addition to the depth-to-water measurements and sampling that will be collected as part of the groundwater monitoring conducted at the wells listed in Table 2, the following wells also will be measured for depth-to-water, but will not be sampled during the annual groundwater monitoring and sampling:

- STF-MON-A-004
- USGS-036
- USGS-112
- USGS-127
- LF2-10
- USGS-037
- USGS-113
- M12S
- USGS-020
- USGS-038
- USGS-114
- USGS-085
- USGS-034
- USGS-077
- USGS-115
- USGS-035
- USGS-111
- USGS-116
- ICPP-164B
- ICPP-164C
- ICPP-166
- ICPP-167

The depth-to-water measurements from these additional wells will provide a broader basis of groundwater-level elevations for the area around the CFA from which more complete groundwater contour maps may be constructed. Digital gyroscopic surveys were performed on 16 wells in 2002 and one well in 2003, to accurately determine their deviations. Based on the gyroscopic survey results, subsequent annual monitoring reports will include the new groundwater contour map prepared from the corrected depth-to-water measurements collected during the CFA landfill sampling events.

6. REPORTING AND REVIEW

The CFA landfills monitoring activities will be reported as set forth in the Federal Facility Agreement and Consent Order (DOE-ID 1991), the ROD (DOE-ID 1995), and this document. Quality-assured data collected during the monitoring will be submitted to the Agencies no later than 120 days from the time of collection. Any other data collected, which require no quality assurance (such as groundwater elevations, neutron-probe access tube, and TDR data), will be submitted as part of the annual monitoring report (see schedule in Appendix A).

The annual report also will include the results of nitrate sample analysis in the groundwater beneath and near the CFA. The inclusion of these data will satisfy the ROD requirement stipulated by the EPA and IDEQ for annual reporting of nitrates in the groundwater (DOE-ID 2000).

Each report will summarize the annual CFA landfill monitoring results, including moisture infiltration monitoring, soil-gas vapor monitoring, and groundwater monitoring results (as applicable). The report also will include conclusions and recommendations for Waste Area Group 4 landfill and groundwater monitoring and sampling based on the results of the data collected, analyzed, reviewed, and prepared for the report.

A 5-year summary of monitoring data will be prepared every 5 years as part of the 5-year review for all WAG 4 sites, and will be submitted to the EPA and IDEQ for review. The 5-year review will evaluate the need for continued monitoring or revision to the frequency and scope of monitoring. In accordance with the OU 4-13 ROD (DOE-ID 2000), the review will include an evaluation of groundwater nitrate concentration trends until nitrate concentrations fall below the MCL of 10 mg/L. Successive reviews will continue at 5-year increments until final closure of the monitoring program.

7. HEALTH AND SAFETY

Occupational health and safety will be ensured through implementation of the task-specific *Health and Safety Plan for Environmental Restoration Long-Term Sitewide Groundwater Monitoring* (INEEL 2003b). The Health and Safety Plan includes, but is not limited to, the following:

- Identification of task-site responsibilities and personnel
- Personnel training requirements and medical monitoring program
- Hazard evaluation, personal protective equipment, and the decontamination process.

8. REFERENCES

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Appendix A

Monitoring Schedule

Appendix A

Monitoring Schedule

Table A-1 contains the schedule for infiltration, soil gas, and groundwater monitoring as well as the reporting and review schedule for the Central Facilities Area landfills for the years 2003–2006. The schedule will continue the same as Calendar Year 2006 in subsequent years, unless negotiated otherwise with the Agencies.

	Schedule for CY 2003 Month												Schedule for CY 2004 Month											
Activity	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
NPAT Logging	XX	XX	XX	XX	X	X	X	X	X	X	X	X	XX	XX	XX	XX	X	X	X	X	X	X	X	X
TDR Logging Data Download	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VOC and Methane Sample Collection	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—
Groundwater Monitoring"																								
Water Level Measurements	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Groundwater Sampling	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Reporting and Review																								
Data Submission to Agencies	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
Monitoring Report	—	—	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—

Table A-1. (continued).

Activity	Schedule for CY 2005 Month 1	2	3	4	5	6	7	8	9	10	11	12	Schedule for CY 2006[b] Month 1	2	3	4	5	6	7	8	9	10	11	12
Infiltration Monitoring																								
NPAT Logging	XX	XX	XX	XX	X	X	X	X	X	X	X	X	XX	XX	XX	XX	X	X	X	X	X	X	X	—
TDR Logging Data Download	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Soil Gas Monitoring"																								
VOC and Methane Sample Collection	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—
Groundwater Monitoring"																								
Water Level Measurements	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Groundwater Sampling	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—
Reporting and Review																								
Data Submission to Agencies	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
Monitoring Report	—	—	X	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—

a. Soil gas monitoring, groundwater monitoring, and water level measurements will be performed in the fall (September, October, November).
b. The schedule Will continue the same as CY 2006 in subsequent years, unless negotiated otherwise With the Agencies.
CY = calendar year
NPAT = neutron-probe access tube
TDR = time-domain reflectometer
VOC = volatile organic compound